

RETAINING WALL B-7

A building permit is required for retaining walls in excess of 4 feet. This measurement is taken from the bottom of the footing to the top of the masonry. Retaining walls of any size supporting a surcharge other than soil also require a building permit. The appropriate San Diego County Regional Standard may be used for construction. Link provided below. Contact the Building Division for information on how to obtain a building permit for a retaining wall.

For construction details refer to the San Diego County Regional Standards at:
<http://www.regional-stds.com/home/book/drawings>.

INSPECTIONS

- Inspections must be performed and approved during several phases of retaining wall construction. Please call for an inspection at the following times:
- When the footing has been excavated, the reinforcing steel is tied into its final position, and the site is ready for concrete to be placed, a foundation inspection is required.
- An inspection of the wall reinforcement and masonry unit lay-up is required before grouting the wall.
If clean out holes are used, masonry may be laid to the full height of the grout pour before calling for the inspection. Grout shall then be poured in a continuous pour in lifts not exceeding six feet. If clean out holes are not used, a pregrout inspection is required prior to each grout pour. Block cannot be laid higher than the grout pour. Note that cleanouts are required for all grout pours in excess of five feet.
- After grouting is complete, and wall drain systems are in place, a backfill/drainage inspection is required.
- When all backfill and fine grading operations are finished, a final inspection is required.

BUILDING PLANCHECK CHECKLIST FOR RETAINING WALLS

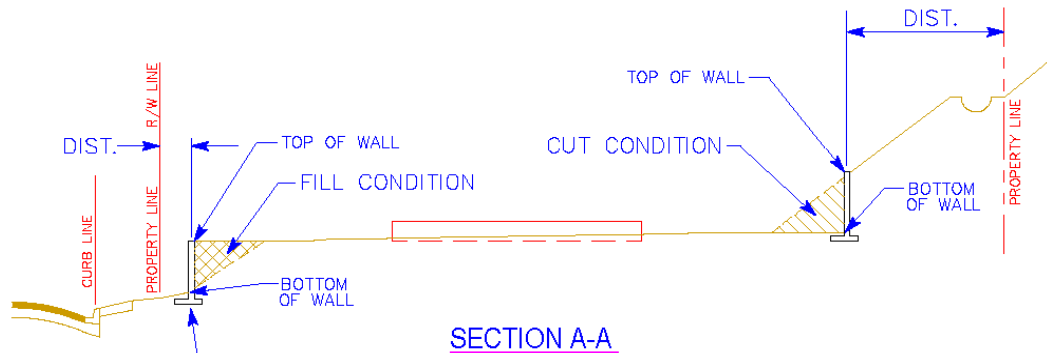
Provide a fully dimensioned site plan drawn to scale. Show:

- ♦ North Arrow
- ♦ Easements
- ♦ Existing & Proposed Structures
- ♦ Retaining Wall(s)
- ♦ Property Lines (dimensioned from street)
- ♦ Show Proposed location(s) of walls
- ♦ Show wall heights (top of wall-TW and bottom of wall-BW) at ends of walls, tallest points of wall & at points of height change.
- ♦ Drainage patterns
- ♦ Existing and proposed slopes
- ♦ Existing topography

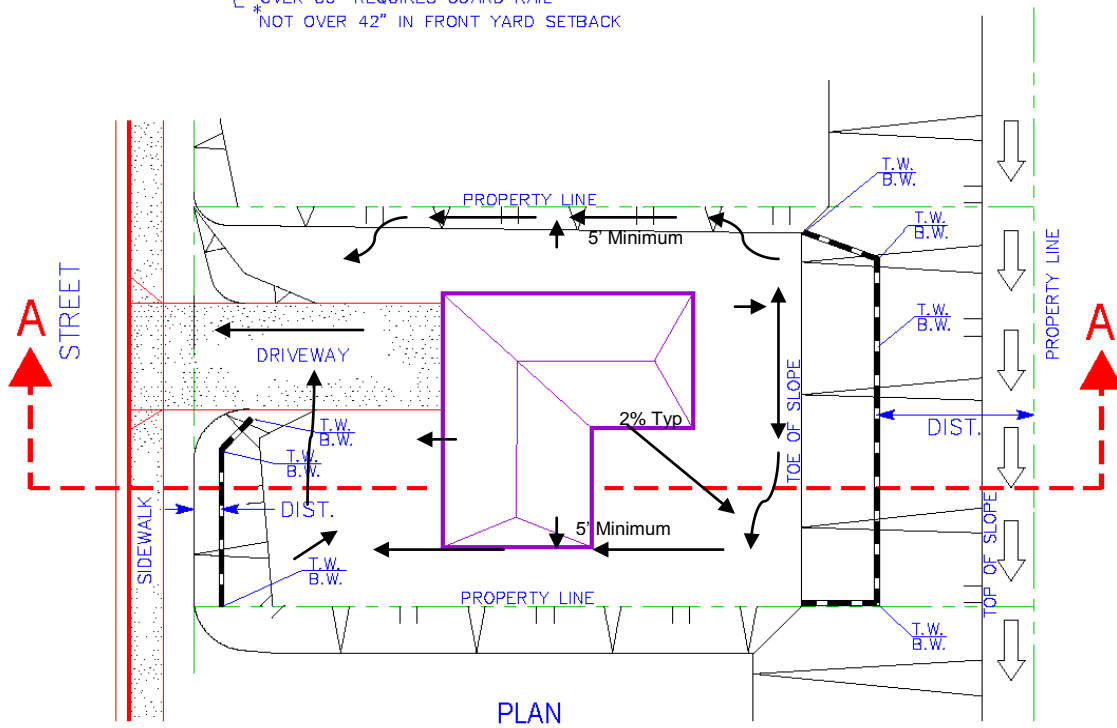
Include on plans:

- ♦ Site address
- ♦ Assessor's parcel number
- ♦ Legal description

Grading quantities: Cut_____ Fill_____ Import/Export_____



* OVER 30" REQUIRES GUARD RAIL
 * NOT OVER 42" IN FRONT YARD SETBACK

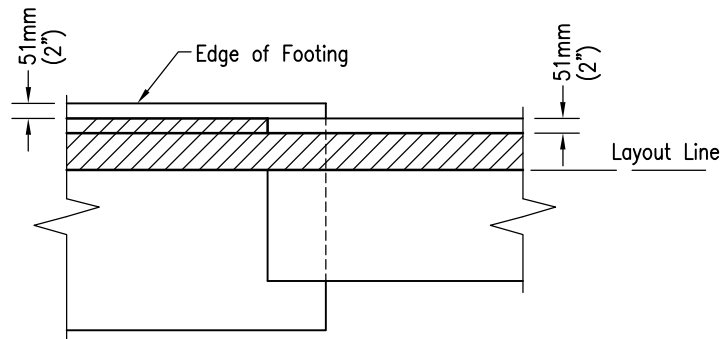


T.W. — TOP OF WALL ELEVATION
 B.W. — BOTTOM OF WALL ELEVATION
 PROVIDE CUBIC YARDAGE
 OF PROPOSED CUT/FILL

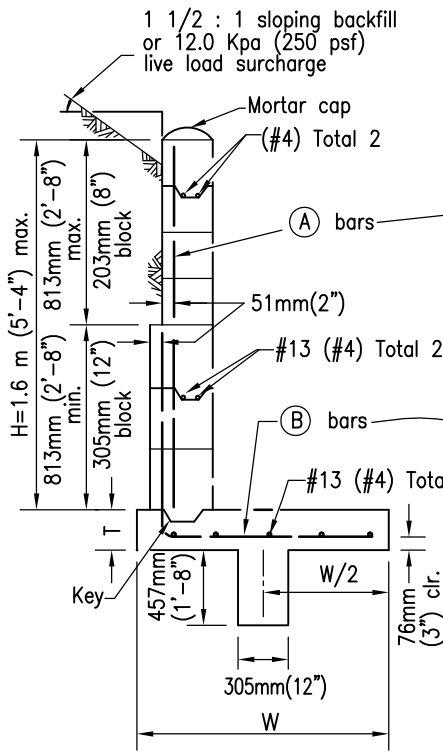
CITY OF CARLSBAD

SAMPLE PLOT PLAN FOR RETAINING WALLS

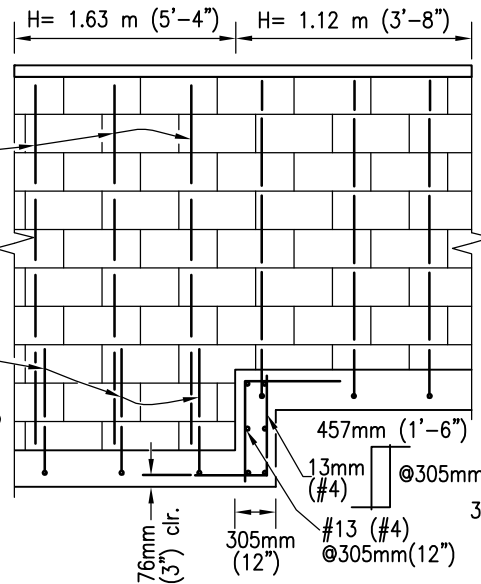
DRAWN BY: SCOTT EVANS, CARLSBAD ENGINEERING DEPT. 1/28/03 C:\TEMPORARY DRAWINGS\RETAINING WALL EXHIBIT.DWG



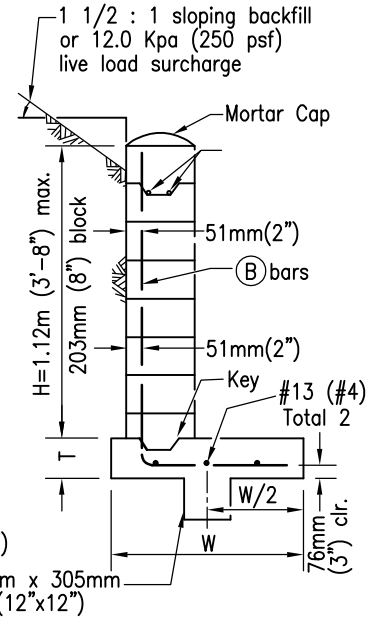
PLAN



TYPICAL SECTION
over 1.12m (3'-8")



ELEVATION
Horizontal reinf. not shown

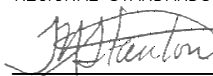


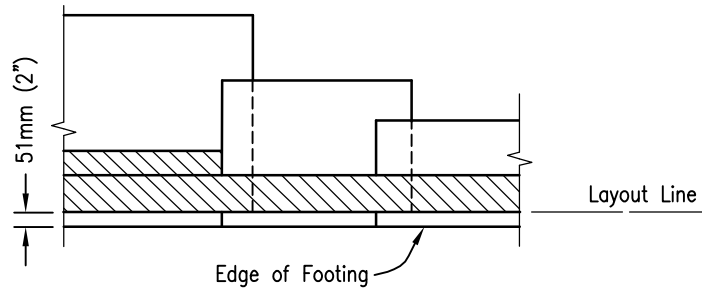
TYPICAL SECTION
1.12 m (3'-8") max.

DIMENSIONS AND REINFORCING STEEL		
H (max.)	1.63m (5'-4")	1.12m (3'-8")
T (min.)	254mm (0'-10")	254mm (0'-10")
W (min.)	1.52m (5'-0")	1.14m (3'-9")
(A) Bars	#13@406mm (#4@16")	—
(B) Bars	#19@406mm (#6@16")	#13@406mm (#4@16")
max. soil press.	33.5 Kpa (700psf)	26.3 Kpa (550psf)

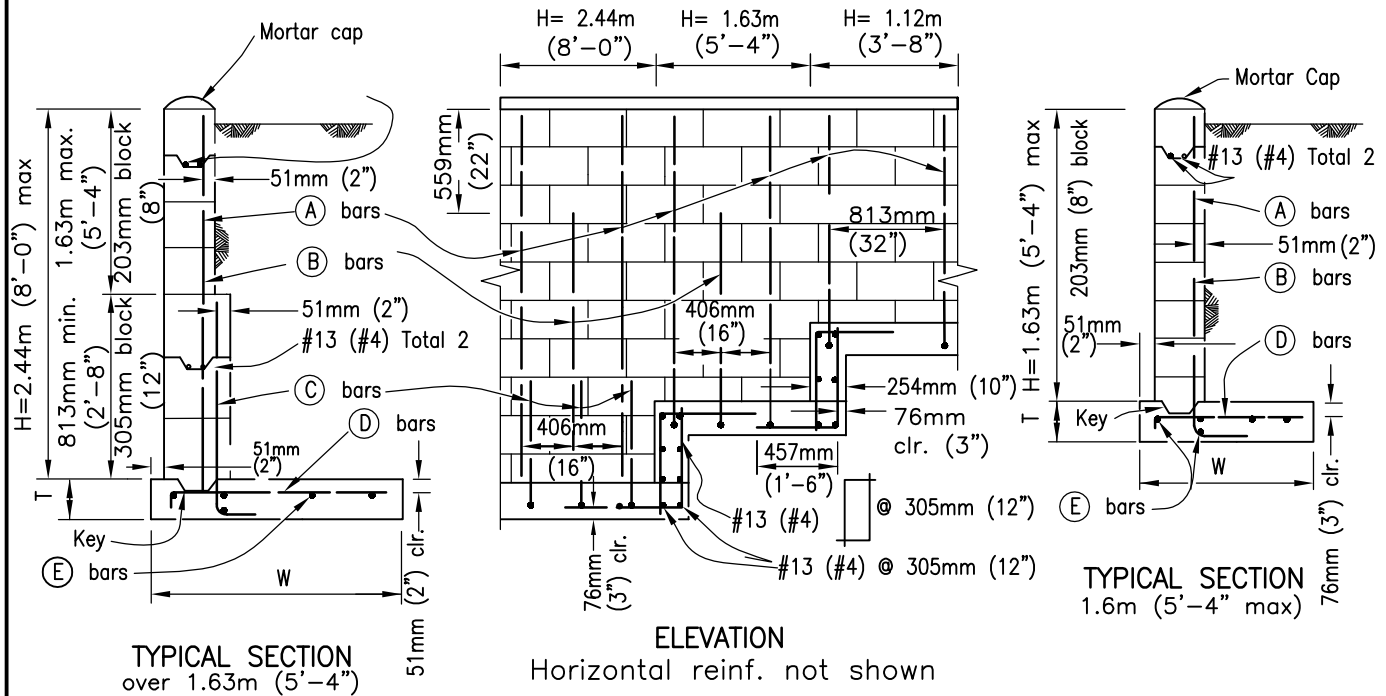
NOTES:

1. See Standard Drawings C-7 and C-8 for additional notes and details.
2. Fill all block cells with grout.

Revision	By	Approved	Date	SAN DIEGO REGIONAL STANDARD DRAWING		RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE	
ORIGINAL		Kercheval	12/75	MANSONRY RETAINING WALL TYPE 2 (LIVE LOAD SURCHARGE OR SLOPING BACKFILL)			3/01/2003
Add Metric		T. Stanton	03/03				
						Chairperson R.C.E. 19246	Date
						DRAWING NUMBER	C-2



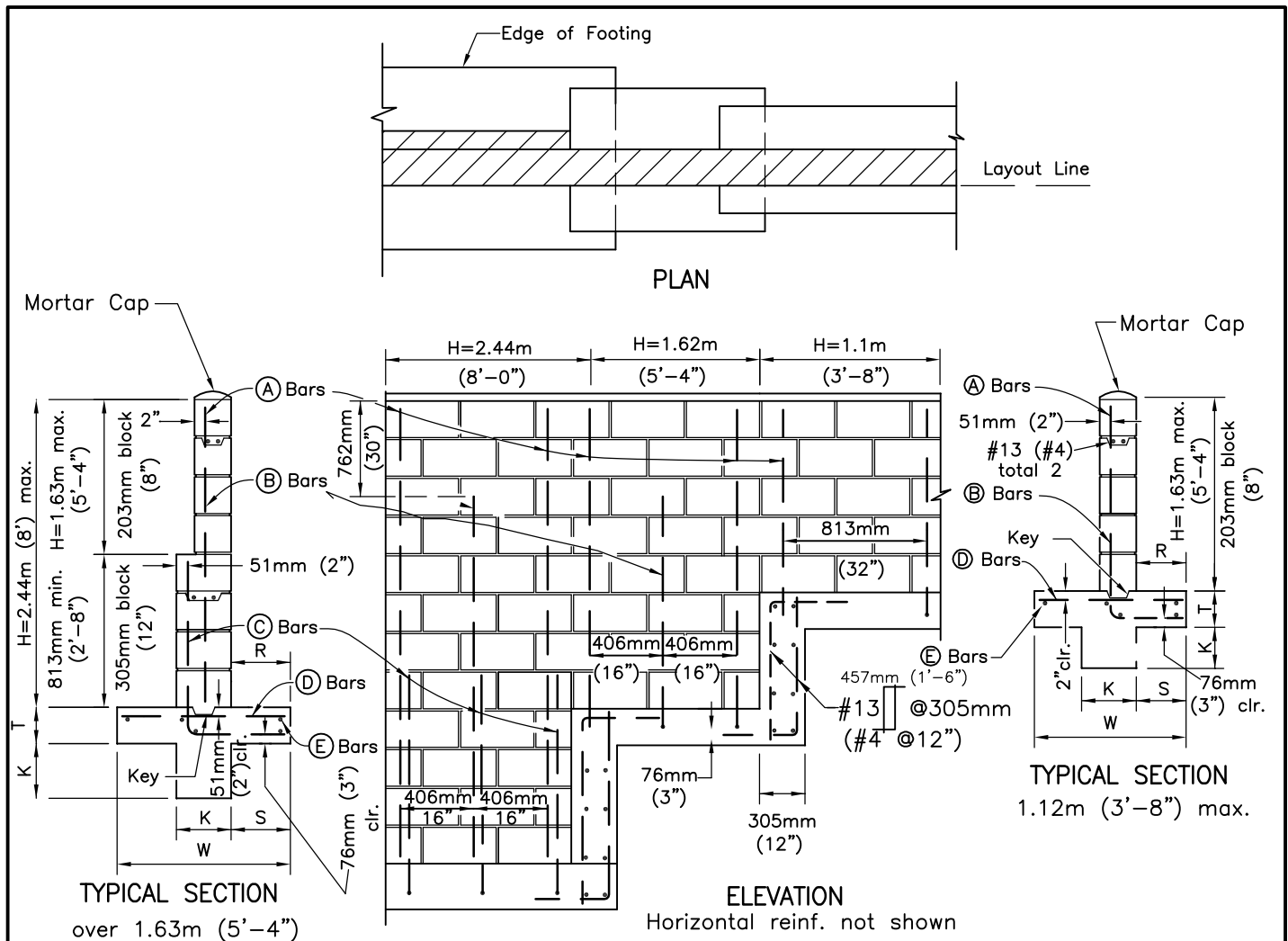
PLAN



DIMENSIONS AND REINFORCING STEEL			
H (max)	1.12 m (3'-8")	1.63 m (5'-4")	2.44m (8'-0")
T (min)	203 mm (0'-8")	254 mm (0'-10")	305mm (1'-0")
W (min)	762 mm (2'-4")	965mm (3'-2")	1.45m (4'-9")
(A) Bars	#13@813mm (#4@32")	#13@813mm (#4@32")	13mm@813mm (#4@32")
(B) Bars	—	#13@813mm (#4@32")	13mm@813mm (#4@32")
(C) Bars	—	—	406mm (#6@16")
(D) Bars	#13@813mm (#4@32")	#13@406mm (#4@16")	406mm (#6@16")
(E) Bars	#13 (#4) total 4	#13 (#4) total 5	13mm (#4) total 6
max soil press. (psf)	7.6 MPa (1100psi)	11.0 MPa (1600psi)	15.2 MPa (2200psi)

- NOTES: 1. See Standard Drawings C-7 and C-8 for additional notes and details.
2. Fill all block cells with grout.

Revision	By	Approved	Date	SAN DIEGO REGIONAL STANDARD DRAWING		RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE	
ORIGINAL		Kercheval	12/75			<i>[Signature]</i> 3/01/2003	
Add Metric		T. Stanton	03/03	MASONRY RETAINING WALL TYPE 3 (LEVEL BACKFILL)		Chairperson R.C.E. 19246 Date	
						DRAWING NUMBER C-3	

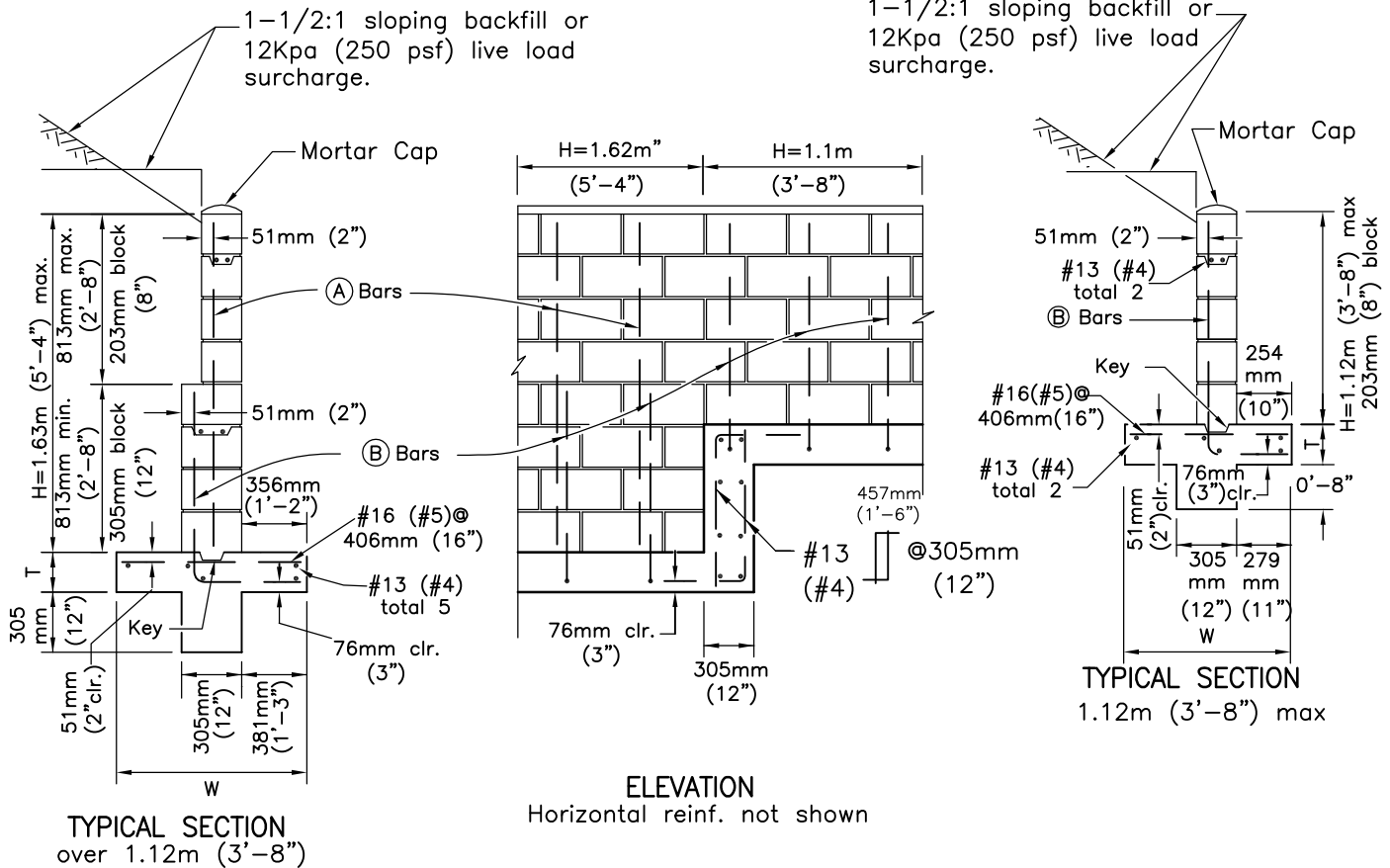
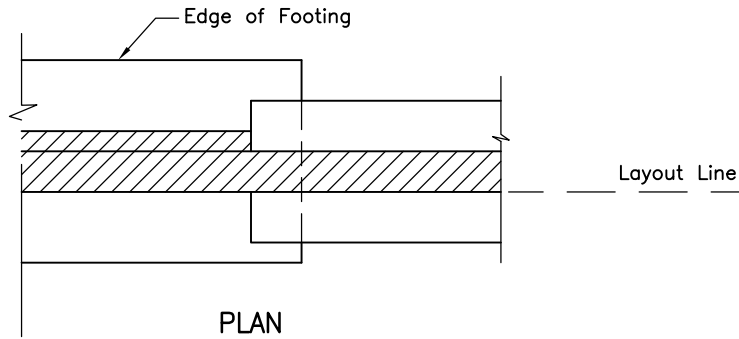


DIMENSIONS AND REINFORCING STEEL			
H (max)	1.12m (3'-8")	1.63m (5'-4")	2.44m (8'-0")
T (min)	203mm (0'-8")	254mm (0'-10")	305mm (1'-0")
W (min)	635mm (2'-1")	940mm (3'-1")	1.25m (4'-3")
R	229mm (0'-9")	356mm (1'-2")	432mm (1'-5")
S	216mm (0'-8 1/2")	318mm (1'-1 1/2")	495mm (1'-7 1/2")
K	203mm (0'-8")	203mm (0'-8")	305mm (1'-0")
(A) Bars	#13(#4)@813mm(32")	#13(#4)@813mm(32")	#13(#4)@813mm(32")
(B) Bars	—	#13(#4)@813mm(32")	#13(#4)@813mm(32")
(C) Bars	—	—	#22(#7)@406mm(16")
(D) Bars	#13(#4)@813mm(32")	#13(#4)@406mm(16")	#13(#4)@406mm(16")
(E) Bars	#13(#4) total 5	#13(#4) total 5	#13(#4) total 6
Max. Toe Press.	37.1 Kpa (774 psf)	49.3 Kpa (1,030 psf)	79.5 Kpa (1,660psf)

NOTES:

1. See Standard Drawings C-7 and C-8 for additional notes and details.
2. Fill all block cells with grout.

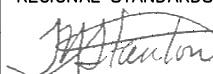
Revision	By	Approved	Date	SAN DIEGO REGIONAL STANDARD DRAWING		RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE	
ORIGINAL		Parkinson	2/95	MASONRY RETAINING WALL TYPE 5 (LEVEL BACKFILL)		 3/01/2003 Chairperson R.C.E. 19246 Date	
Add Metric		T. Stanton	03/03				
						DRAWING NUMBER C-5	



DIMENSIONS AND REINFORCING STEEL		
H (max)	1.63m (5'-4")	1.12m (3'-8")
T (min)	254mm (0'-10")	203mm (0'-8")
W (min)	1.17m (3'-10")	838mm (2'-9")
Ⓐ Bars	#13(#4)@406mm(16")	—
Ⓑ Bars	#19(#6)@406mm(16")	#13(#4)@406mm(16")
Max. Toe Press.	95.8 Kpa (2,000 psf)	67.0 Kpa (1,400 psf)

NOTES:

- See Standard Drawings C-7 and C-8 for additional notes and details.
- Fill all block cells with grout.

Revision	By	Approved	Date	SAN DIEGO REGIONAL STANDARD DRAWING		RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE	
ORIGINAL		Parkinson	2/95			<div> Chairperson R.C.E. 19246 Date 3/01/2003</div>	
Add Metric		T. Stanton	03/03				
				MASONRY REATAINING WALL TYPE 6 (LIVE LOAD SURCHARGE OR SLOPING BACKFILL)		DRAWING NUMBER C-6	

DESIGN CONDITIONS:

Walls are to be used for the loading conditions shown for each type wall. Design H shall not be exceeded. Footing key is required except as shown otherwise or when found unnecessary by the Engineer. Special footing design is required where foundation material is incapable of supporting toe pressure listed in table.

DESIGN DATA:**Reinforced Concrete:**

$F_c=8.3$ Mpa (1200 psi) $F'_c=20.7$ Mpa (3000 psi)
 $F_s=138$ Mpa (20,000 psi) $n=10$

Reinforced Masonry:

$F'_m=41.4$ Mpa (600 psi) $F_m=1.4$ Mpa (200 psi)
 $F_s=138$ Mpa (20,000 psi) $n=50$
 Earth=1922 kg/cu m (120 pcf) and Equivalent Fluid
 Pressure=1.76 kg/sq m (36 psf) per 305mm (foot)
 of height.

Walls shown for 1 1/2:1 unlimited sloping surcharge are designed in accordance with Rankline's formula for unlimited sloping surcharge with a $\phi = 33^\circ$ 13m(42').

REINFORCEMENT:

Intermediate grade, hard grade, or rail steel deformation shall conform ASTM A615, A616, A617. Bars shall lap 40 diameters, where spliced, unless otherwise shown on the plans. Bends shall conform to the Manual of Standard Practice, A.C.1. Backing for hooks is four diameters. All bar embeddings are clear distances to outside of bar. Spacing for parallel bars is center to center bars.

MASONRY:

All reinforced masonry retaining walls be constructed of regular or light weight standard units conforming to the "Standard Specifications for Public Works Construction."

JOINTS:

Vertical control joints shall be placed at 9.75m (32') intervals maximum. Joints shall be designed to resist shear and other lateral forces while permitting longitudinal movement. Vertical expansion joints shall be placed at 29.3m (96') intervals maximum.

CONCRETE:

Footing concrete shall be 332 kg/M³-C-22Mpa (560-C-3250), using Type B aggregate when placing conditions permit.

BACKFILL:

No backfill material shall be placed against masonry retaining walls until grout has reached design strength or until grout has cured for a minimum of 28 days. Compaction of backfill material by jetting or ponding with water will not be permitted. Each layer of backfill shall be moistened as directed by the Engineer and thoroughly tamped, rolled or otherwise compacted until the relative compacting is not less than 90%.

FENCING:

Safety fencing shall be installed at the top of the wall as required by the agency.

INSPECTIONS:

Call for inspections as follows:

- A. When the footing has been formed, with the steel tied securely in final position, and is ready for the concrete to be placed.
- B. Where cleanout holes are not provided:

(1) After the blocks have been laid up to a height of 1.22m (4') or full height for walls up to 1.52m (5'), with steel in place but before the grout is poured, and.....

(2) After the first lift is properly grouted, the blocks have been laid up to the top of the wall with the steel tied securely in place but before the upper lift is grouted.

Where cleanout holes are provided:

After the blocks have been laid up to the top of the wall, with the steel tied securely in place, but before grouting.

- C. After grouting is complete and after rock or rubble wall drains are in place but before earth backfill is placed.

- D. Final inspection when all work has been completed.

CONCRETE GROUT AND MORTAR MIXES:

Concrete grout shall attain a minimum compressive strength of 13.8 Mpa (2,000 psi) in 28 days and mortar shall attain 12.4 Mpa (1,800) psi in 28 days. All cells shall be filled with grout. Rod or vibrate consolidation. Bring grout within 10 minutes of pouring to insure grout to a point 51mm (2") from the top of masonry units when grouting of second lift is to be continued at another time.

MORTAR KEY:

To insure proper bonding between the footing and the first course of block, a mortar key shall be formed by embedding a flat 2 x 4 flush with and at the top of the freshly poured footing. The 2 x 4 should be removed after the concrete has started to harden (approximately 1 hour).

A mortar key may be omitted if the first course of block is set into the fresh concrete when the footing is poured, and a good bond is obtained.

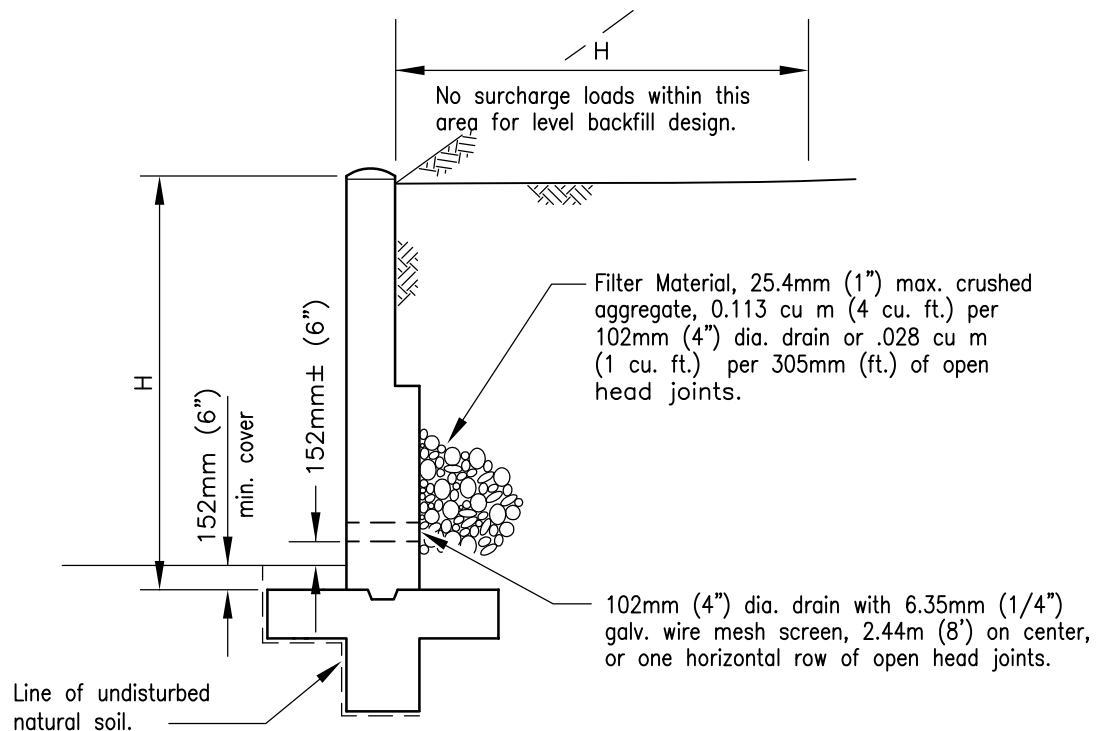
WALL DRAINS:

Wall drains shall be provided in accordance with Standard Drawing C-8.

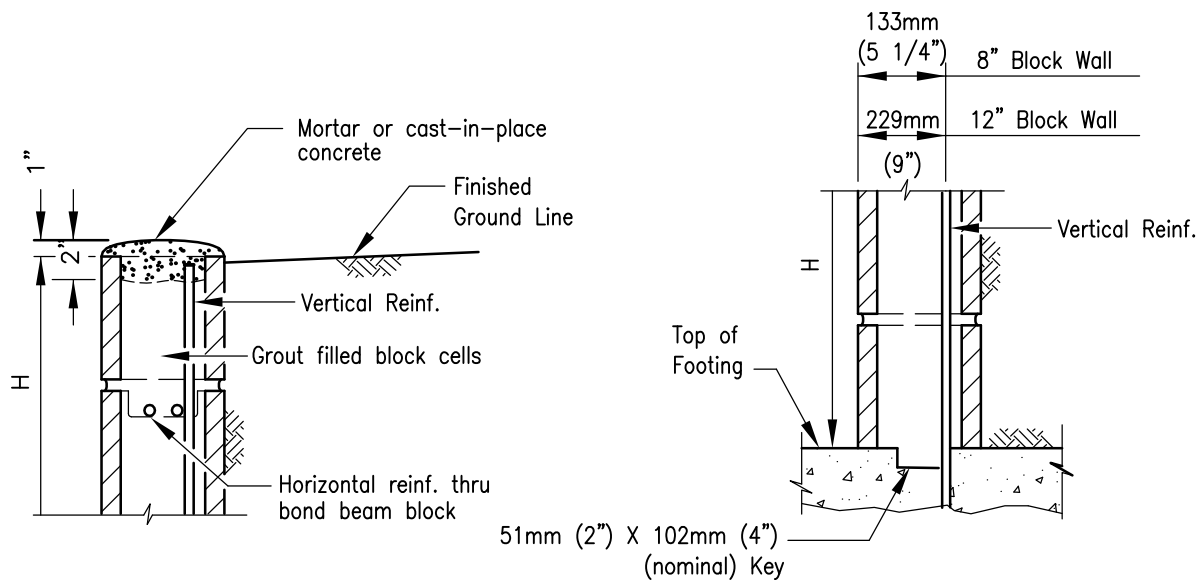
SOIL:

All footings shall extend at least 305mm (12") into undisturbed natural soil or approved compacted fill. Soil should be dampened prior to placing concrete in footings.

Revision	By	Approved	Date	SAN DIEGO REGIONAL STANDARD DRAWING		RECOMMENDED BY THE SAN DIEGO REGIONAL STANDARDS COMMITTEE	
ORIGINAL		A. Kercheval	12/75	GENERAL NOTES FOR MASONRY RETAINING WALLS			3/10/2003
Add Metric		T. Stanton	03/03				
						Chairperson R.C.E. 19246	Date
						DRAWING NUMBER	C-7



TYPICAL SECTION



CAP DETAIL

KEY DETAIL

NOTES:

1. All masonry retaining walls shall be constructed with cap, key and drainage details as shown hereon.
2. 102mm (4") diameter drain may be formed by placing a block on it's side.

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ORIGINAL		Kercheval	12/75		
Add Metric		T. Stanton	03/03	DETAILS FOR MASONRY RETAINING WALL	 3/01/2003 Chairperson R.C.E. 19246 Date
					DRAWING NUMBER C-8